

deposited in the automatic transaction system 1, the customer may select a product 10 to be dispensed using the keypad 90. The corresponding product delivery apparatus 20 will then dispense the selected product 10 to the product delivery area 30 where it may be retrieved by the customer. Any resulting change from the transaction may be paid out through a coin return 80, the bill pay out recess 85 or credited to an inserted electronic purse device.

FIG. 5 is a partial cutaway side view, not drawn to scale, of the vending machine 1 of FIG. 4 showing a typical component layout along the control panel 40. Money acceptors, such as a bill validator 100 and a changer 110, are attached to the rear of the control panel 40 adjacent the bill insert and coin slots 60 and 50, respectively. The changer 110 is connected to the coin return 80 and to a coin passageway 117 leading to the coin slot 50. The bill validator 100 is connected to a bill stacker 105. The changer 110 and bill validator 100 are capable of discriminating coins and bills respectively.

A bill escrow and pay out unit 115 is positioned adjacent the bill pay out recess 85 and is connected to the bill validator 100. The bill escrow and pay out unit 115 is capable of dispensing bills as change through the bill pay out recess 85. The bill validator 100 may divert deposited acceptable bills to the bill escrow and pay out unit 115 to replenish its supply of bills for change. Suitable bill escrow and pay out units 115 include those disclosed in U.S. Pat. No. 5,076,441, as well as others well-known in the art. The cash box 120 is also included in the vending machine 1.

The keypad 90 and display 95 are connected to the vend controller 130 by communication lines 140. The controller 130 is further connected to data input/output devices 135, such as DIP switches 150, a keypad 160, an input/output port 170 and a display 180 to facilitate entering and updating of operating data and servicing of the vending machine 1. The components disposed behind the control panel 40 are not accessible to customers of the vending machine 1 and may only be accessed by service personnel.

The first port P1 of the changer is connected to the vend controller 130 by the communication line C. The card acceptor 70, bill escrow and pay out unit 115, and bill validator 100 are not connected directly to the vend controller 130, but are connected to the second port P2 of the changer 110 via the bus connectors B. The changer 110 is arranged to receive various items of information received on the second port P2 from the bill validator 100, bill escrow and pay out unit 115 and card acceptor 70, and to pass this information, either as received or in modified form, to the controller 130. In particular, each time an acceptable unit of money is validated by either the bill validator 100 or the changer 110, a signal is sent to the vend controller 130 by the changer 110 indicating the value of the received unit.

The changer 110 is also provided with data input/output devices 300, including a keypad 302, display 304, and DIP switches 306.

Any bill validator that is capable of discriminating unique characteristics of bill denominations may be used as the bill validator 100 of FIG. 5. Suitable bill validators 100 include those described in U.S. Pat. Nos. 4,628,194 and 5,222,584, which are hereby incorporated by reference.

The invention has been described in the context of coin validators, but it is to be noted that the term "coin" is employed to mean any coin (whether valid or counterfeit), token, slug, washer, or other metallic object or item, and especially any metallic object or item which could be utilised by an individual in an attempt to operate a coin-operated device or system. A "valid coin" is considered to be

an authentic coin, token, or the like, and especially an authentic coin of a monetary system or systems in which or with which a coin-operated device or system is intended to operate and of a denomination which such coin-operated device or system is intended selectively to receive and to treat as an item of value.

An embodiment has been described above with reference to a changer 110 having first and second ports P1 and P2. This type of device is advantageous because it provides in a single unit the commonly required functions of accepting payment and giving change in the form of coins. However, in other embodiments, other types of money handling unit may be provided with first and second ports P1 and P2 with analogous functions to those of the changer 110.

The described embodiment uses the MDB protocol over the second port P2, but other protocols may be used within the scope of the present invention. Likewise, other protocols in addition to or instead of the Executive, BDV, Electromechanical and MDB protocols may be implemented over the first port P1.

What is claimed is:

1. A device for handling money, including:

a money handling apparatus;

an internal controller for controlling the money handling apparatus;

a first port for removable connection to an external controller for communication with the internal controller; and

a second port for removable connection to a further device for handling money;

wherein the internal controller is arranged to communicate over the second port with the further device using a communications protocol; and

wherein the communications protocol enables communication between the internal controller and any one of at least first and second different types of device for handling money, the first type handling money of a different type from those handled by the second type.

2. A device as claimed in claim 1, wherein the first and second types of device are different members of a group consisting of a banknote validator and a card reader.

3. A device as claimed in claim 2, wherein the group further consists of a coin dispenser.

4. A device as claimed in claim 1, wherein the communications protocol is a bus-oriented protocol.

5. A device as claimed in claim 4, wherein the communications protocol is an MDB protocol.

6. A device as claimed in claim 1, wherein the internal controller is arranged to distinguish between said first and second type of device for handling money by a code received from said further device over said second port.

7. A method of communication for a money handling apparatus, including:

communicating with an external controller over a first port, and

communicating with a further money handling apparatus over a second port by means of a communications protocol supporting communication with any one of at least first and second different types of device for handling money, the first type handling money of a different type from that handled by the second type.

8. A device for handling money, including:

a money handling apparatus;

an internal controller for controlling the money handling apparatus;

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a first port for removable connection to an external controller for communication with the internal controller; and

a second port for removable connection to a further device for handling money for communication with the internal controller;

wherein the internal controller is arranged to copy the content of signals between the first port and the second port.

9. A device as claimed in claim 8, wherein the content of all signals received on said first port is output without modification as signals on said second port and the content of all signals received on said second port is output without modification on said first port.

10. A device as claimed in claim 8, wherein the content of some of the signals received on the second port is modified prior to output on said first port.

11. A device as claimed in claim 10, wherein said signals, the content of which is modified, includes signals characteristic of the further device and not recognisable by said external controller.

12. A device as claimed in claim 8, wherein the internal controller implements, on both said first and second ports, a bus-oriented communications protocol.

13. A device as claimed in claim 8, wherein said signals are stored in memory prior to output.

14. A method of communication for a money handling apparatus, including:

communicating with an external controller over a first port; and

communicating with a further money handling apparatus over a second port;

wherein the content of signals is copied between said first and second ports.

15. A device for handling money, including;

a money handling apparatus;

an internal controller for controlling the money handling apparatus;

a first port for removable connection to an external controller for communication with the internal controller; and

a second port for removable connection to a further device for handling money for communication with the internal controller;

wherein the internal controller is arranged to convert between first units of value used for communications over said first port and second units of value used for communication over said second port.

16. A device as claimed in claim 15, wherein the internal controller is arranged to receive an indication of the value of money received by said further device in said second units, to convert said value to said first units, and to output data representing said value in said first units on said first port.

17. A device as claimed in claim 15, wherein the internal controller is arranged to receive a command including an indication of a value in said first units on said first port, to convert said value to said second units, and to output a corresponding command including an indication of said value in said second units on said second port.

18. A device as claimed in claim 15, wherein the internal controller is arranged to determine a first value of money

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received by said money handling apparatus, to receive an indication of a second value of money received by said further device in said second units, and to combine said first and second values as a combined value in a single set of units.

19. A method of communication for a money handling device, including:

communicating with an external controller via a first port, communicating with a further money handling device via a second port, and

converting between first units of value used for communication over said first port and second units of value used for communication over said second port.

20. A device for handling money, including:

a money handling apparatus;

an internal controller for controlling the money handling apparatus;

a first port for removable connection to an external controller for communication with the internal controller; and

a second port for removable connection to a further device for handling money for communication with the internal controller;

wherein the internal controller is arranged to receive a code indicative of the type of the further device on the second port, and to output in response thereto on the first port an amended code representative to said external controller of a type different from that of the further device.

21. A method of communication for a money handling device, including:

communicating with an external controller via a first port, communicating with a further money handling device via a second port,

receiving a code indicative of the type of the further device on the second port, and

outputting in response thereto on the first port an amended code representative to said external controller of a type different from that of the further device.

22. A device for handling money, including:

a money handling apparatus;

an internal controller for controlling the money handling apparatus; and

a plurality of first ports each arranged for removable connection to an external controller for communication with the internal controller;

wherein the internal controller is arranged to detect to which of said first ports the external controller is connected and to communicate with the external controller using a communications protocol selected according to the detected one of the first ports.

23. A method of operating a money handling device having a plurality of ports each arranged for removable connection to an external controller, including:

detecting to which of said ports the external controller is connected and communicating with the external controller using a communications protocol selected according to the detected one of the ports.

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